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PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

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Notices.

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NOTICE.

MANY CORRESPONDENTS STILL FORWARD THEIR COMMUNICATIONS TO THE OLD ADDRESS. WILL THEY PLEASE NOTE THAT OUR ADDRESS IS

56, CHANCERY LANE, LONDON, W.C.

Notes.

THE *Photographic Times*, of New York, will in future be edited by Mr. Walter E. Woodbury, who, until a recent date, has been the representative of the Paget Prize Plate Co. The paper will be increased in size, and many important features added, including prize competitions.

* * *

THE best oxygen retorts, says Mr. D. W. Noakes, of Greenwich, are made from disused mercury bottles, as they seem to have everlasting wear. After making up over a quarter of a ton of chlorate in one of these retorts, Mr. Noakes opened it, and, to all appearances, the retort would have lasted out another quarter ton. This gives the life of one of these retorts at about 4,500 feet of gas.

* * *

As soon as the necessary alterations and additions are completed, Messrs. Perkin, Son & Rayment intend opening a West End branch at 141, Oxford-street.

* * *

A SILVER medal has been awarded by the Royal Agricultural Society and British Beekeepers' Association to Messrs. Newton & Co., for a set of lantern slides on Bees and Bee Culture, from photographs taken by Mr. T. E. Freshwater.

* * *

A NEW anti-halation plate has been patented by Messrs. Edwards and Ransom, and arrangements are being made to place it upon the market.

THE First Annual Exhibition of the Midland Camera Club will be held at the Botanical Gardens, Moseley, Birmingham, from October 2nd to 14th. Full particulars may be obtained from the hon. sec., Mr. C. Jevons Fowler, 4, Woodstock-road, Moseley, Birmingham.

* * *

LANTERN condensers made of glass composed of sand 70 parts, china clay 25 parts, and soda 34 parts are, we hear, to be the article of the future, as a German chemist states that it is almost an impossibility to crack them in the ordinary course of a lantern exhibition.

* * *

ONE hears at times some queer descriptions of lenses. A short time ago, when a contemporary was describing the lens of a particular hand-camera, the editor stated that the single achromatic lens with which it was fitted was a *double achromatic lens*; probably he had just found out that it consisted of two glasses cemented together, and so inferred that the proper designation was "double"; this is almost on a par with the optician's assistant who spoke of a *crossmatic lens*, and when the customer asked what sort that was, replied that "it was one that made the rays of light cross the axis, this make being much better than the common kind."

* * *

WE learn that a firm in Japan intend sending sets of native hand-painted slides to this country. The slides are painted on gelatine and are said to be excellent even in the finest detail.

—:o:—

A Complex (Polytechnic) Slide and How to Make It.

IN our June issue, Mr. Wilkie made mention of an ingenious slide representing Cupid shooting an arrow, which effect created a great sensation at the Royal Polytechnic many years ago. As we had several inquiries respecting the mode by which it was effected, we have obtained the identical slide used, and will endeavour to give such an explanation as will enable those possessing an artistic and mechanical turn to make one, which, when projected upon the screen, will present an astonishing and pleasing effect.

As this slide is the property of Mr. W. R. Hill, it must be understood that, although no objection is offered to any of our readers making one for their own use, it must not be made for commercial purposes without the permission of the owner. It was designed by the late Mr. Childe, and drawn and painted by Mr. Hill. We understand that up to the present but two people besides ourselves have had an opportunity of inspecting the mode of working of this slide.

In the following cuts, each part has been made in exact proportion, so that little difficulty should be experienced by those who may wish to make one.

On the glass, which is afterwards fastened in the frame shown at Fig. 1, is painted the major part of the figure, which should then be blocked out to the edges with opaque varnish, excepting the small portion D seen at the right hand side, which is left blank for reasons which will presently be explained.

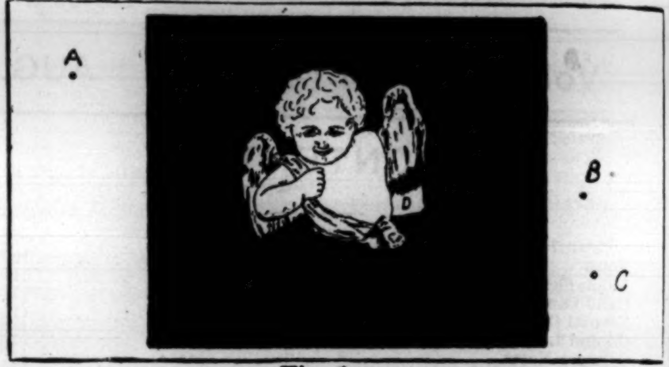


Fig. 1.

On the under side of the glass, Fig. 2, is painted in the position indicated, an arm holding a bow. On the right hand of this will be seen an opaque patch, the object of which will also be obvious presently. Levers, which can be made of cardboard, must be attached, and a hole made in the shorter arm at B.

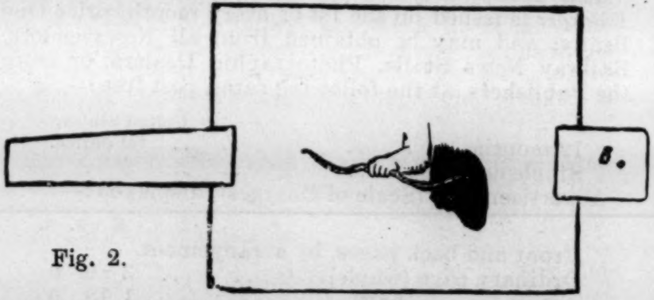


Fig. 2.

Care must be taken when cutting the strip of glass, Fig. 3, and at the place shown must be painted (also on the under side) an arrow. This strip may be made partly of glass and partly of cardboard, the junction being made at the line indicated, and a hole bored at C.

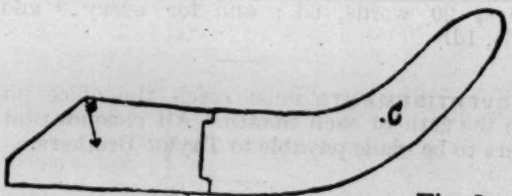


Fig. 3.

For sake of convenience, the greater part of Fig. 4 can be made of zinc, to which can be attached two pieces of talc, painted out to the requisite size and shape with opaque varnish. A hole is pierced in the zinc as at A.

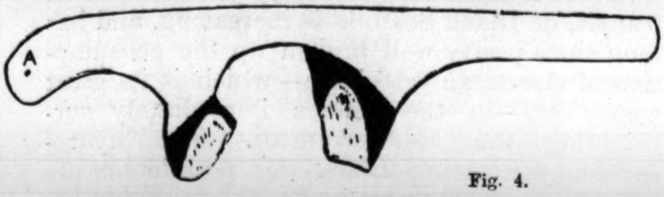


Fig. 4.

The necessary parts of the slide having been sketched and painted, the next thing is to secure them on the frame in their respective places, and to ascertain that they fit accurately. The glass containing Cupid having been fastened in its place, the glass, Fig. 2, should be fastened by a screw at B. Next the arrow may be adjusted by a screw in like manner at C, and then the wings, Fig. 4, at AA.

Excepting the fastening of a glass at the back containing the eyes, the slide is ready for placing the stops in position.

The eyes will roll or move from side to side by slightly moving the glass on which they are painted. Raising or lowering the lever of Fig. 4 will give the appearance of the wings fluttering. Next the lever of Fig. 3 can be depressed, which will bring the end of the arrow close to the forefinger of the figure. By slowly pushing down the lever of Fig. 2, the effect of drawing the bow will be given; and if everything be made in the exact proportion given in the sketches, the bowline will be represented by the edge of the glass, Fig. 3, which, to brighten the effect, may have the edge blackened.

Having put the slide together, the reason for the white patch on Fig. 1 and the black patch on Fig. 2 will be apparent, for unless the white patch were left, the end of the bow would not be seen. By raising the end of the lever, Fig. 3, the arrow will appear to be shot from the bow, whilst the manipulation of the lever, Fig. 2, brings the bow back to it original position again.

A fine effect can be produced with a double lantern by flashing on (soon after the arrow has left the bow) a picture of a heart with an arrow sticking in it; or, better still, without the arrow, which, on the slipping-slide principle, can easily be made to appear as in the act of striking its target.

We have at the present time in our possession the walking skeleton slide, which was used at the Polytechnic with the Phantasmagora lantern, at which time it created such a wierd effect. This slide we shall describe, with drawings, in our next issue.

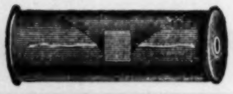
Hand-Cameras for obtaining Slides for the Lantern.

	"Facile"	March 1st, '90
No. 1	"Giah"	May 1st, ,,
,, 2	"Quadrant"	June 1st, ,,
,, 3	"Eclipse"	July 1st, ,,
,, 4	"Eureka"	Aug. 1st, ,,
,, 5	"Key"	Sept. 1st, ,,
,, 6	"Optimus"	Oct. 1st, ,,
,, 7	"The Griffin"	Nov. 1st, ,,
,, 8	"The Swinden"	Dec. 1st, ,,
,, 9	"Collins"	Feb. 1st, '91
,, 10	"Kodak"	Mar. 1st, ,,
,, 11	"Guinea"	April 1st, ,,
,, 12	"Vanneck"	May 1st, ,,
,, 13	"Chadwick"	June 1st, ,,
,, 14	"Bonanza"	July 1st, ,,
No. 15	"Repeater"	Aug. 1st, '91
,, 16	"Marvel"	Sept. 1st, ,,
,, 17	"Talmer"	Oct. 1st, ,,
,, 18	"The Omnigraph"	Nov. 1st, ,,
,, 19	"Ubique"	May 1st, '92
,, 20	"Daylight Kodak"	June 1st, ,,
,, 21	"The Radial"	July 1st, ,,
,, 22	"The Surprise"	Aug. 1st, ,,
,, 23	"Perfect"	Sept. 1st, ,,
,, 24	"Frena"	Oct. 1st, ,,
,, 25	"Meteor"	May 1st, '93
,, 26	"Archer"	June 1st, ,,
,, 27	"Uno"	July 1st, ,,

No. 28. "BULL'S-EYE."

AMONG the "notes" in our issue for September, 1892, we stated that the proprietors of the *New York Recorder* were giving a hand camera, together with a copy of that paper, for a specified time for a certain amount. It appears that this particular camera is now upon the English market, having been just imported by the European Blair Camera Co. (Limited), of 9, Southampton Street, W.C. This camera is neat, well made, and takes pictures of 3½ inches square or of circular shape, and can be loaded with a film cartridge in daylight, no dark room being required.

Supposing the camera to be empty, it is loaded as follows:—By undoing a screw at the bottom, the exterior covering can be drawn off.



Film Cartridge.

A prepared cartridge film is then dropped into place, and secured by a spindle passing through the wooden reel; the end of the black paper, which will be found on the cartridge, is then drawn over the focal plane, and its end slipped through a slot in another reel upon which it is wound, the handle of this being on the outside of camera. The black paper having been placed in position, the outer casing of the camera is now put on, when immediately at the back of it will be seen a small hole covered with ruby glass. The black paper is then wound on the latter reel until the figure 1 appears at the aperture, which indicates that sufficient film (which is rolled up with the black paper after the fashion of ribbons in drapers' shops) has been brought opposite the focal plane. Subsequent turning of the key brings other figures, up to 12, opposite the aperture, each figure denoting that sufficient film has been unrolled for another exposure. After the figure 12 has been reached the film ceases, but there is a sufficiency of black paper left to be rolled on the reel to protect the film from light after the cartridge has been taken out. The paper having all been wound on the reel, the camera may again be opened, the exposed cartridge removed, and a new one slipped into place and adjusted as before in daylight.

This instrument is provided with a finder, ever-set time or instantaneous shutter, and single achromatic lens. It sells at an extremely moderate price.

——:o:——

Normal Capacity of Cylinders.

By Horace Hilton (Brighton).

One or two correspondents when speaking of the normal capacity of gas cylinders, appear to be somewhat mystified. The following table which explains itself, may aid them in their difficulty :—

Contents of cylinders charged at 120 atmospheres.	Normal capacity of cylinder.
120 cubic feet.	1 cubic foot.
100 ,,	$\frac{5}{6}$,,
80 ,,	$\frac{2}{3}$,,
60 ,,	$\frac{1}{2}$,,
50 ,,	$\frac{5}{12}$,,
40 ,,	$\frac{1}{3}$,,
25 ,,	$\frac{5}{24}$,,
20 ,,	$\frac{1}{6}$,,
12 ,,	$\frac{1}{10}$,,
10 ,,	$\frac{1}{12}$,,
8 ,,	$\frac{1}{15}$,,
5 ,,	$\frac{1}{24}$,,

——:o:——

Oils and Lamps for the Lantern.—No. III.

By W. H. Harrison.

The nature of the wicks used having been shown to have considerable influence upon the light-yielding character of petroleum lamps, the next point deserving attention is the nature of the oils. Keeping the outside of the lamp clean and free from oil is well known to have much influence in either preventing smell altogether, or in reducing its amount; but there are some oils in the market that even Mr. C. H. Bothamley, with all his training in chemistry, was unable to burn in the lantern without an objectionable amount of smell, and the specimens in question were found to come from the Black Sea. The supply, or rather the transit, of Black Sea oils is increasing, and has long since pretty well broken up the consumption of American petroleum—which is its great competitor—in the regions immediately surrounding the Mediterranean. The hydrocarbons composing Black Sea petroleums are not the same chemically as those composing American petroleums. These facts should therefore be borne in mind by the users of lanterns, and as the quantity of oil burnt in lanterns is so small as to make a slight increase in expense no object, dealers might do well to keep on sale for them Scotch paraffin oil as supplied to lighthouses, which is not objectionable as to smell when properly used; it has flashing points of 130° F. to 140° F., and much higher for lightships; this oil as used in lighthouses is not allowed anywhere in the lamps and reservoirs to reach a higher temperature than 86° F.

A curious fact about some mineral oils is, that at high temperatures they have been known to decrease in illuminating power. A statement was once made before the Glasgow Section of the Society of Chemical Industry, that Dr. Stevenson Macadam knew of one instance in a lighthouse in which an extra series of reflectors, by increasing the temperature so diminished the light that they had to be removed. A reflector does harm in a magic lantern when the centre of the circle of which circle or globe it forms a part, does not coincide with the centre of the flame of the ring burner; but if placed properly and worked to the proper curve it is beneficial with argand flames. The possibility of its diminishing the light of the flame by increasing the heat thereof should be borne in mind, although it is highly improbable that any such case will practically occur in connection with the lamps used in magic lanterns. The demand for lanterns of small bulk is all right when the lime light is used, but is all wrong when applied to oil lanterns. The latter should be large, and have particularly large air-channels, especially below, to help to keep the oil reservoir cool, and the roof of the lantern should have such a shape and so little polish as to reduce its reflecting power to the lowest; if it were a concave mirror let us say for the sake of argument, the reflected rays would make the oil reservoir below exceedingly hot. A useful thing for lanternists would be a series of experiments with different lanterns in the market, to ascertain what temperature the oil in the lamp of each attains after an hour's work; curious differences might be found, and when traced out to their causes, the information would be practically useful. The conical shades to throw down the light from ordinary parlour oil lamps have been known, according to experiments tried by Mr. Ivison Macadam, to sometimes raise the temperature of the oil in the reservoir to 86° F.

A mistake, and an exceedingly common one, is the supposition that oils of high flashing point are under all conditions more safe than oils of the lowest flashing point authorised by Act of Parliament. A petroleum explosion is of the same nature as a gas explosion, that is to say, that there must first be a mixture of the particular hydrocarbon with common air. One result is, that when a lamp reservoir begins to get empty, an oil of low flashing point may be giving off enough vapour to keep air out of the upper part of the reservoir, and the vapour not then being mixed with air, an explosion cannot take place on the application of a flame. With a better oil, volatilising more slowly, there is more danger of an explosive mixture forming and being fired when there is free communication between the lamp and the reservoir. Mr. Boverton Redwood has publicly stated that for some years he and Sir Frederick Abel had examined the fragments of various lamps with which accidents had occurred in the metropolitan district, and wherever possible they had also examined specimens of the oil which had been used, and, later still, by desire of Colonel Majendie, they had made farther investigations into lamp accidents. The outcome was that some of the most violent explosions had been found to have occurred with oils of high flashing point, so such oils do not under all conditions tend to safety. Most of the accidents in burning petroleum are due to defective lamps, and one made of glass or other brittle material should never be used, because of the liability to breakage. The proper construction of the lamp, and the keeping of its air-channels and other parts clean, are the chief elements demanding attention in minimising danger.

What has been said, shows how many little points will require consideration in the construction of the best oil lantern of the future for optical projection, an instrument which is certain to appear in due course because of the influence of trade competition, and because the advent of triple condensers of colourless glass at one great bound enables oil magic lanterns to be constructed for common use, and to yield a vastly better illuminated disc than average lanterns give at present. If behind such a condenser a Trinity House three-wicked Douglass burner be placed, and used with the same oil as supplied to lighthouses, whereby a flame of 180 candle-power will be obtained, these two elements alone will give an oil illumination of the screen not commonly seen. Unless my memory is not at fault with lapse of time, Sir James Douglass told me some years ago that he had given up all his patent interests in the paraffin burners known by his name, and that anyone is at liberty to make them; but before anyone does so, he had better make sure that I am not mistaken upon this point. This three-ring burner requires an abnormally long chimney, which is not necessary with the two-ring burner; the latter gives the light of sixty standard candles.

—:o:—

Cylinder Notes.

By A. M. Hiddon.

Some recent experiences lead me to believe that, as often as not, it is the mismanagement of the cylinder of compressed gas which causes those trifling mishaps and hitches which occur to the beginner when he first operates with some form of lime-light. Some novices at first regard a full cylinder with an undeserved amount of apprehension and distrust; and then afterwards familiarity breeds a contempt which results in the cylinder receiving a more careless treatment than it should be subjected to. Perhaps a few odd notes and wrinkles, none of them new, may be of use to those who during the next season intend to operate with compressed gas for the first time.

A visitor leaves an oxygen factory with two impressions firmly fixed on his mind:— 1st, a feeling of wonder at the complicated automatic machinery by which the gas is produced; 2nd, the thoroughness of the precautions and safeguards which are to eliminate the slightest possibility of an accident occurring to the user of the cylinder.

The method by which oxygen is extracted from the air is not to be explained by the unmechanical mind, suffice it to say that the process is very elaborate and perfect, and that the pure oxygen is rapidly evolved to an accompaniment of rather weird and awe-inspiring whizzes, clashes, bangs and snorts. The gas is stowed in holders and from thence is pumped into the cylinders; four of them being filled at a time. A safety valve on the pump renders it impossible to compress more than the proper quantity of gas into a cylinder.

The contrivance by which cylinders are tested before being issued is simple but perfect.

Briefly it is this :—The cylinder is immersed in an iron envelope which is filled with water, and by a clever arrangement a tight joint is made around the neck of the bottle. The requisite pressure is applied by means of an hydraulic pump, and the water displaced by the stretching of the cylinder is raised up a glass tube which communicates with the iron envelope in which the cylinder is placed. The pressure of 4,000 lbs. to which these bottles are tested is sufficent to raise the column of water in the tube nearly two feet. On the pressure being released, it is a *sine quâ non* that the water in the gauge shall fall back to its original height : thus indicating that not only has the cylinder withstood the necessary pressure, but also that it has not been over-strained or suffered any permanent stretch. If the bottle fails in this respect it is promptly rejected. Therefore beginners may have perfect faith inthe trustworthiness of all cylinders subjected to this test. If, in some unlooked for way, a cylinder did afterwards become unable to withstand the usual pressure, this weakness would become apparent whilst it was being filled, and for this reason : A considerable amount of heat is developed during the process of filling, so that in order that the cylinder shall contain the proper amount of gas when cool, a rather greater amount of gas, so to speak, has to be pumped in. Thus a 12-foot oxygen cylinder would register nearly 15 feet when first filled. The subsequent contraction of the gas by the radiation of this heat lowers the pressure and makes an explosion in the user's hands altogether unlikely.

With regard to the practical use of these cylinders, the following hints may be of benefit to inexperienced operators. On receiving the cylinder from the dealers, first examine it for leakage, for sometimes the rough usage the valve gets on the road will start a slight escape. Fill the opening of the valve with water—a bubble or two will at once denote leakage if present. Next fill the gland nut in the same way ; if it leakes tighten it up slightly with a spanner. The use of the gland nut is to prevent escape round the spindle on which the key fits. If all is right, open the valve sharply for an instant to blow out any dust, etc., which may have lodged about the entrance. In closing the valve use just sufficent strength to shut the gas off, and no more. Always wipe both the cone and seating clean before coupling fittings to a cylinder.

In order to make a perfect joint it is often necessary to tap up the union gently with the key or spanner. The smallest leaks can always be detected either by putting one's ear close to the joint or else by the use of water ; never use a light to locate a leak, it is not necessary and sometimes not safe.

Before connecting a gauge or regulator it is a good plan to first open the valve until the gas can just be heard escaping and then make the connection. In shutting off the gas turn from left to right and remember that a valve is not a "try your strength" machine. After closing the valve wet your finger on your tongue and draw if over the nipple ; if the film thus left rises in a bubble the valve is not shut gas-tight.

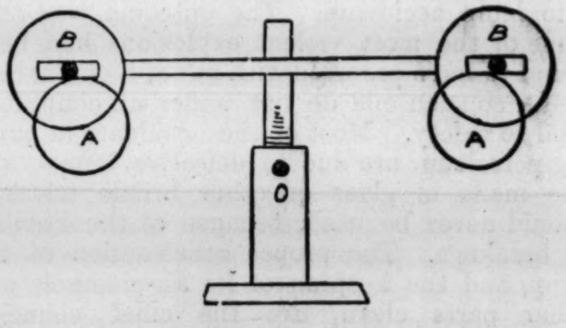
For single lanterns automatic regulators are not absolutely necessary, a longish lever key and an easy-going valve will give full and sufficient control over the oxygen supply. Non-automatic Regulators, such as Noakes', are very useful for single lanterns. Great care must be taken to prevent the threads of screw fittings from being chipped or injured. It is useless to attempt to to make a joint perfect by means of soap, white lead or anything of that sort, and, above all, oil or grease in any form must never be applied to any part of the valve or fittings.

—:o:—

A Dissolver of 1848.

By Jex Bardwell (*Detroit*).

As a discussion has recently been going on in these columns respecting the date at which dissolving views were introduced, I submit a sketch of a dissolving fan which I purchased with other apparatus either in 1848 or 1849 from a Mr. Collins, who was at that time connected with the Royal Polytechnic, London. The lanterns were lighted with oil (circular wicks), and were placed side by side, whilst immediately in front was set the dissolver. AA being the lenses of the lanterns, BB the covers for same. The correct height could be adjusted by the screw C. The cover BB were capable of a slight side adjustment. The dissolving was effected by moving the lever up or down, so that when one lens was open, the other remained covered. This particular lantern I speak of was used by me publicly in Michigan in 1850-51.



Memo from my Note Book.

LANTERNS AT EXHIBITION OF 1851.

BY RICHARD EMPSON.

(*Continued from page* 104.)

Between the sides and the front and back there are diaphragms of black leather, bent like the bellows of an accordion, to allow of the angular movement and yet prevent any light from escaping. The front slides are put in from above, which is found to be even more convenient than in the former arrangement.

The front lever, which opens and closes the shutters, is bent to allow of this, and is moveable about a ring round the chimney, whilst a semi-circular space in the top, above the centre tube, allows of the motion of the cranks of revolving slides. Now, the light being placed in the centre of such a box, it is clear that it will, at whatever angle the tubes are inclined, prove true with respect to the light.

When the side tubes are placed in such a manner that they form with it an angle of 68°, or even less, this will allow of the back of the prism being inclined so much less, and a perfect disc obtained of seven feet diameter at twelve feet distance, with a plain right angle prism, and if a lenticular, right-angled prism be employed, of about thirty inches focal length, the diameter of the disc will be increased to nine or ten feet. This is sufficient for every ordinary purpose, giving a twenty-feet disc at twenty-four feet distance, perfectly bright, and only a very slight imperfection at the side furthest from the centre owing to the lenticular side sloping a little from the direct axis of light. In order, however, to remove this last imperfection, Mr. Beechey has had constructed a prism, which he believes will be found of the most perfect form.

Thus constituted, the prismatic trinoptric lantern becomes a very perfect instrument for lectures and exhibitions. The pictures produced by the sides are equal to those of the front. Three perfect lanterns are in the hands of the operator at once, which can all be made to bear upon one point, producing the most beautiful dioramic effects. A single light, whether the ogygen and lime lamp or a small camphine or good solar lamp, according as the exhibition is large or small, is all that is required, though the oxygen and lime light is greatly to be preferred, as free from heat or smell, and so very superior in intensity.

The trinoptric and dioptric prismatic lanterns, within less compass than a single lantern of the ordinary construction, combine all the powers of two or three distinct lanterns: with only one small lamp of intense brightness a perfectly-defined disc of twenty feet from each tube may be obtained; the disc, by means of the prism, may be united to produce perfect coincidence, or at various distances. The lamp is on the fountain principle, with a small circular wick: a small tube passes through centre of wick for the purpose of supplying oxygen gas, by which an intense light is produced, nearly equal in illuminating power to the oxy-hydrogen of Drummond.

—:o:—

An Angel in Moleskin

(A SHORT STORY FOR LANTERN ILLUSTRATIONS),

BY JACK O'LANTERN.

(*Concluded from page* 105).

(19) I HAD not seen him thus dressed before. Here stood a man in what had once been white moleskin clothes, now besmeared with oil and smoke. His face, too, resembled that of a miner, and was not altogether prepossessing, grimed as it was with a cosmetic of grease, dirt, and coal-dust. "My little job ready, guv'nor," he said. "Quite ready, sir," I returned. "Well, I won't take it now," he went on, "shall be out in an hour or so and will drop in; must have a wash before I can handle anything you know. My fireman," he continued, "has been away to day, poor chap, on the sick list, so I've had a stiff time to myself." And addressing X L, 310, "Boy's getting on, Baxter. Did you notice him with his mother?" Baxter nodded. "Bless you, I can see him getting stronger every day, and hope now to make a man of him." "Ah," remarked Baxter, "it wasn't the doctor that pulled him through, Fred, but your own nursing." "Put it down," said Fred, "a bit to each, and the main lump to God," and again turning to me said, "Shall see you later on, guv'nor; for the present, ta-ta."

"A bit to each," muttered Baxter, "and the main lump to God. That's Fred all over; can't stand the slightest praise! The most unselfish nature I have known. So you will say when you've seen more of him."

(20) "Why, sir, all last winter, and it was a long and trying one as you remember, that man struggled manfully in keeping the wolf not only from his own door but from those he loved and cared for. Eight of 'em living on his scanty earnings. What is he? Oh, drives a donkey engine or something of that sort on the North-Eastern, the wages for which are little enough under ordinary circumstances, but with a child at death's door for weeks, and an old mother not much better, the pinch 'o the shoe is doubly

painful. Another word and we must be off," went on X L, 310.

(21) "I met Fred coming down that hill, it must be four or five months ago, but I shall never forget it, I assure you, for having kids of my own I could, as it were, enter into the situation. The parish doctor had been attending his child, just when it pleased him, or more often staying away when it pleased him. 'Baxter,' Fred said, as we met, 'the fact of the doctor giving up Fred's young life, I believe, has been the means of saving it. Last Saturday morning he told Maggie he had done what he could, but the child was past human skill. This naturally upset us both, so in the afternoon I made off to Dr. Preston's to ask him to call. Preston received me kindly, but said he did not consider I was in a position to pay his fees. I was prepared for that day at any rate, I explained, for, Baxter, I had just parted with my watch for the purpose. Well,' continued Fred, 'Preston came, examined my boy, and said he hoped he was in time, but more would depend upon us than him, and if his instructions were strictly carried out, he hoped it would only be necessary to call a few times, and that he would willingly do for sweet charity sake. He could see my position, Baxter, I suppose, for when I offered him the trifle for which we had received such unbounded value, he closed my fingers over the coin, and said softly (as if heaven shouldn't hear him) spend it on the child, he'll want it.

(22) "And at that moment," said XL. 310, "a great crystal bead found its way to the ridge of Fred's left eye, toppled over, and broke on his dirty but honest cheek."

This, then, was the black burglar brute I had feared so much—the one villain who had haunted my very dreams; the purloiner of my peace.

Here was a man who could boast of more sympathy and kindness in his little finger than the writer possessed in the whole of his anatomy.

I took his hand that evening when he called for his property. "Of course you remember it, guv'nor," he said, referring to the watch I had handed him; "told you I would bring it here again. Here I am, and whenever I get the chance I mean to recommend you, for you and the ticker did me a good turn that day, but I'll tell you more about it some other time. Good-night, and thanks."

I have ever since showered reproaches upon my incredulity of the wrongs I might have caused, and which to the present day are unknown to.

(23) My Angel in Moleskin.

Lantern-slide Making in America.

By Charles L. Mitchell, M.D.*

The vast majority of lantern slides made in America by amateurs are prepared from gelatine plates, collodion emulsion being very little used, and wet collodion being employed by but few outside the regular commercial slide manufacturers. Perhaps this may be partly explained by a prevailing fondness for the black and grey tones, so easily obtained with gelatino-bromide emulsions. There is, however, a rapidly-growing taste for warmer tints in brown, and even sepia, or Bartolozzi red. Quite a number of different brands of lantern-slide plates are found in our market, and of varied excellence. Of these, those prepared by the Eastman Company are probably the most popular. I have always used gelatine dry plates for preparing my own slides, and I am a firm believer that, all things being equal, it is quite possible to prepare as good, if not, perhaps, even a better slide upon a gelatine plate than can be obtained by any other procedure, while its convenience and readiness for immediate use render it much to be preferred.

The size of the American lantern slide plate is always 3¼ by 4 inches, thus differing from the English size, which is usually square, and 3¼ by 3¼ inches. We, in America, think the oblong shape the best, as it allows of a rather larger picture, gives ample room for the label, and also for taking hold of the slide when placing it in the lantern. We can hardly expect in a country like England, where customs are firmly established, that a change of size would readily be adopted. And yet it is highly desirable, in view of the growing interchange of slides between not only England and America, but also with other countries, that some one standard and uniform size for all should be adopted. The present difference often leads to considerable annoyance on account of fitting the varying sizes into the carriers generally used for the lantern. This difficulty is less in America, however, than in England, for it is always easier to put a small slide into a larger carrier than it is a large slide into a small carrier. I notice, indeed, that one English photographic periodical has announced that in future it will receive no slides for composition unless made of the uniform size of 3¼ by 3¼ inches. This is much to be regretted, for it would seem possible in such cases to use an ordinary "push through" carrier, and I hope the example will not prove contagious, for it will tend to check these international exchanges and competitions and prevent many on each side of the water from becoming acquainted with the best examples of well-known workers.

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* Photo. Convention.

In the preparation of lantern slides, I believe that the majority of our best workers in America prepare their slides by reduction in the camera. I have been informed that in England the reverse is true, the larger number being prepared by contact. I think this difference may partly be ascribed to the fact that the sizes of negatives adapted for contact printing (3¼ by 3¼ and 3¼ by 4¼ inches) are not as popular in America as they are in England. We do not use the 3¼ by 3¼ size at all, and for all small work the most popular size is 4 by 5 inches. This does not lend itself so well for contact work, and hence the reducing camera is more frequently brought into requisition. My own preference is unquestionably for reduction by the camera, even when preparing slides from small negatives.

There seems to be a certain quality gained which is sometimes missing in contact work, and, in addition, the process affords many facilities for shading or vignetting different parts of the negative, which may need either holding back or prolonged exposure.

The character of the light used is also another prime factor. In my own experience I use two different lights—a south light, where full sunlight falls directly upon a ground glass window; and a north light, where the window is of clear glass and at an angle of about 45° to the horizon, thus securing an even, soft illumination all over the negative. I use one or the other of these lights, according to the character of the negative, as will be detailed later.

Returning again to the subject of lantern slide plates, I may say that I do not believe it possible, when using all varieties of negatives, dense or thin, to obtain uniform excellence with one grade of plate. This would stand to reason, for a slow landscape plate will give a different negative from one made with an emulsion of high rapidity. I, therefore, use two grades of plates, one quite slow, giving great contrast, the other several times as rapid. In the former I use the Eastman plate, for the latter the transparency plate made by the Cramer Dry Plate Works, of St. Louis, Mo. These two varieties are used as follows:—Given a very strong, perhaps even harsh, negative, quite dense, and yet with plenty of detail. In order to bring out all the best points of the negative, a strong, intense light is required, and nothing but sunlight seems to answer the requirement. A weaker light will not penetrate the dense portions of the negative, and the corresponding parts of the positive lose detail. Furthermore, the negative probably possesses too much contrast already, and the endeavour should be to reduce this contrast, and at the same time obtain all the detail possible. I therefore use here the fast lantern slide plate and fully time the exposure, using a diluted developer. The harshness of the negative is thus materially reduced in the positive, and the rapidity of the plate makes it more susceptible to the weak light coming through the dense portions of the negative, and thus renders the detail properly. Lantern slides made in this manner are usually quite warm in tone.

Now, on the contrary, suppose a soft, thin negative full of detail, but with comparatively little density. Here the advantage of the slow plate and the soft north light becomes apparent. This soft, even illumination is amply sufficient to penetrate any part of the negative, and yet, not being so intense as the sunlight, does not so rapidly overtime the plate. The slow lantern slide emulsion is amply sensitive enough to render the detail perfectly in all parts of the negative, and with a moderately short exposure gives good contrast and a brilliancy much exceeding that of the original. It is thus possible to obtain from an inferior negative quite a crisp and brilliant lantern slide. The tones obtained by this method are usually grey or black.

For a developer, I use a mixture of eikonogen and hydroquinone in the proportion of fifteen parts of hydroquinone to eighty-five of eikonogen. Eikonogen by itself does not always give the brilliancy or the density desired, but this is easily obtained when a small percentage of hydroquinone is added. The development of a lantern slide is an entirely different matter from that of a negative. In the latter, the time of exposure and the intensity of the light are always, to a certain extent, unknown factors, and the developer must be modified according to the necessities of the case.

With the lantern slide plate the developer, as regards the proportion of reducer and alkali, is always the same, so also is the lighting of the negative. The developer should, therefore, be of a standard strength ascertained to give the best results with a normal exposure, and then, when making the exposure, it must be shortened or lengthened until the desired result is obtained. It will not do here to give a short exposure, and then push development by adding more alkali. The plate will soon fog, and an amount of fog which might perhaps be allowable in a negative would be fatal for a good lantern slide. Nor will it do to overtime, and then restrain development with a bromide, for we shall be apt to get harshness, much density and opacity in the shadows, all fatal defects for a good slide. What should be sought is a correct exposure, then a normal developer, and as the former is always under our control, it is better to reject a few plates, and change the time of exposure until we have it just right, than it is to attempt to modify the developer.

The question of tone here comes in for consideration. This is a matter influenced, first, by the plate, next by the developer, next by the character of the light, next by the exposure, and, lastly, by the negative itself. As I have before remarked, the cool grey and black and white tones are preferred by many in America. There we use eikonogen, hydroquinone, ferrous oxalate, or pyro soda—all developers producing black or grey tones. The warmer tones in most of the slides made by English workers are, I am told, due largely to the use of pyro and ammonia as a developer. Still, for true, warm tones gelatine can hardly be made to equal those obtained with collodion emulsion, either washed or dry.

It is quite possible, however, with a strong negative, a sunlight exposure, a little overtiming, and a developer well diluted with water, to obtain quite warm tones with an ordinary gelatino-bromide emulsion.

As far as regards fixing, there is nothing superior to the acid fixing bath, now so well known. It prevents staining and clears the plate thoroughly.

The plate should always be varnished, to protect it from the effects of moisture. I use for this purpose the "Zapon" varnish, a solution of nitro-cellulose in amyl-acetate and wood alcohol.

As regards matting, the square opening with rounded corners is used by us for all commercial slides. Amateurs who make their own slides vary the opening, however, making it oblong, upright, oval, or round, according to the artistic treatment of the picture.

In labelling the slide, a thumb label is placed on the lower left-hand corner of the face of the slide, while the descriptive label is placed on the opposite end (right-hand), sometimes on the face, but more usually on the back of the slide.

Much might yet be said regarding the arrangement of the negative, apparatus for varying its position (so that either the whole or but a portion can be used), the choice of lenses, varieties of cameras for reducing purposes, &c., but it would occupy too much time. The few extremely general remarks that I have made on the subject of lantern slide making will, I trust, serve to indicate some of our most usual methods of working, and present, perhaps, one or two novel modifications of the orthodox and regular modes of procedure.

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The Magic Lantern as an Aid in Schools.

By Rev. T. Perkins.

At the present time, when the master in any school, where any work of education worthy of the name is carried on, is not satisfied with hearing the boys repeat lessons parrot-wise, or marking mistakes in written exercises without giving his pupils some explanation of the points in which they have gone wrong, anything that will awaken an intelligent interest in the subjects of study should be heartily welcomed in the school. Since the eye is as important an organ as the ear for the reception and conveyance to the brain of accurate information, anything that appeals to the eye should be made use of. The teacher of mechanics will show his pupils working models, if not the actual machines in use; the chemical lecturer will not be satisfied with merely describing experiments, but will perform them before his class; the mathematical master, whose pupils are studying solid geometry, will encourage them to gain accurate notions of space of three dimensions by making models in wood or cardboard, or even by cutting out the geometrical figures from a turnip or big potato; the geological lecturer will exhibit and hand round characteristic fossils and specimens; the anatomical lecturer will get his class to handle the bones he is describing.

No more important auxiliary to education has been introduced of late years than the optical lantern, which, by a process of evolution, has been developed from the magic lantern, which half a century ago was used almost solely to amuse children at Christmas and other parties. The vast strides this instrument has made of late is due to the greater facilities which exist for producing a brilliant light, and to the manufacture of lantern slides by means of photography.

A description of the construction and principles of the lantern will not come within the scope of the present article, but a few words must be said about the various kinds at present on the market, with their advantages and disadvantages, so that the one most suitable for the required purpose may be procured. Lanterns that are really useful instruments may be obtained at as low a price as about fifty shillings, while others costing as many guineas may be seen advertised in dealers' lists. But the high priced biunial and triunial lanterns used by the professional lecturer, who gives "effects" and "dissolving views" are not needed in the class-room; nor are the more expensive objectives and condensers necessary for most practical purposes.

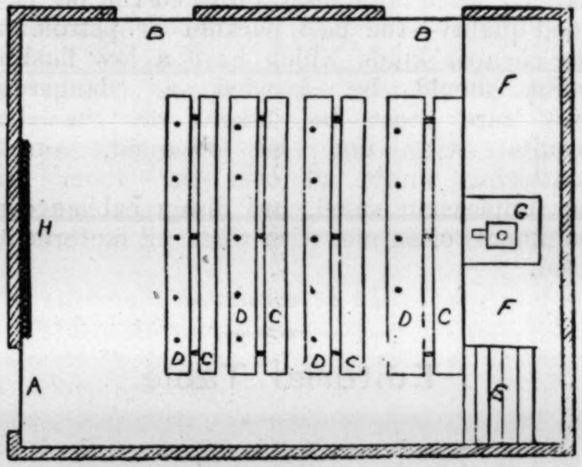
It may be taken for granted that five guineas will purchase a lantern and all needful accessories (slides of course excepted) sufficient for most educational purposes.

Two points demand special attention in selecting an outfit, namely, the focal length of the objective, and the method of illumination to be used.

The following formula connects the focal length (f) of the lens, the distance (d) of the lens from the screen, and the number of diameters (n) the lantern slide is enlarged $d = (n + 1) f$, from which any two of the quantities f, d, n being known, the other can be found. As the standard size of lantern plates is $3\frac{1}{4}$ inches square, and about $\frac{1}{8}$ of an inch is taken off all round by the binding, the largest possible picture available is not more than 3 inches square. Suppose, then, that we wish to get a picture 6 ft. square we must magnify this 24 times, and we shall have $d = 25 f$. Thus, if we are using a 6 in. lens (since $f = \frac{1}{2}$ ft), the distance at which the lantern must be placed from the screen will be 12 ft. 6 in. Or if we wish to produce a picture of the same size, and to place the lantern 8 ft. from the screen, we shall have to use a lens of $\frac{8}{25}$ ft. $= \frac{8 \times 12}{25} = \frac{96}{25} \doteq \frac{21}{25}$ inches focus.

It will be seen from this that the focal length of the lens should be chosen with regard to the size of the room, and the position of the lantern with respect to the screen, and the size of the picture which it is desired to produce on the screen.

A good arrangement of the class-room for lecture purposes is as follows: Assuming the size to be 20 ft. by 16 ft., and the height to be 12 ft.:—At one end a platform 4 ft. high, and 5 ft. from front to back, should be erected; on this the lecturer can stand, and on it also must be placed the table, say 4 ft. by 3 ft., as indicated on the diagram. On this the lantern may be supported, raised on a box or stand, so that the height of the lens above the floor is 8 ft. On the opposite wall a square, 7 ft. each way, reaching from its lower side 5 ft. above the floor to the ceiling, should be covered with smooth plaster, and whitewashed. This will make an admirable screen on which to project the pictures. The lantern lens will in this case be 15 ft. from the wall, and if we determine to make the picture about 6 ft. each way the lens must have a focal length of about 7 inches. Three or even four desks, each 12 ft. long, may be arranged between the platform and the wall on which the pictures are to be projected, and on these there will be ample room for from 20 to 24 pupils, sitting with their backs to the lecturer, and their faces towards the pictures. This arrangement is an admirable one, first because the rays from the lantern will be in no way obstructed; secondly, because sufficient light will be diffused for the students, if necessary, to take notes; and, thirdly, the lecturer from his elevated position will have a good view of his pupils, and so will be able to control any who may be inclined to be inattentive or disorderly. If the light emitted from the lantern is insufficient for this purpose the room may be further illuminated by gas, turned well down, and shaded in such a manner that no direct light from any of the burners falls on the screen.



A, door; B, windows; C, seats; D, desks; E, steps; F, platform; G, table; H, screen.

The slides, all duly arranged before the lecture, can be placed upon the table, and the lecturer if single-handed can pass behind it if he wishes to work the lantern from either side, but his work will be greatly facilitated if he employs one of his pupils to stand on one side of the lantern to put in and take out every alternate slide. Should it be desired to use the room for a larger number of pupils a few extra seats may be provided at the ends of the platform and along the side walls, or, of course, a larger room may be used, in which case it will be desirable to make the projected pictures larger.

We next come to a choice of the method of illumination. This would probably lie between the "lime-light" produced by means of a "safety" or "blow-through" jet, and an oil lamp. The former gives a far more brilliant light, and is almost imperative if the size of the picture is more than 6-ft. square, or if it is considered desirable to have the room tolerably well-lighted. But the lime-light is in some respects more troublesome to work; it necessitates the procuring of oxygen either in steel cylinders or bags, and a supply either of ordinary gas or of hydrogen procured from the manufacturers in steel cylinders, or bottles as the smaller sizes are sometimes called. Full instruction for the use of the lime-light will be issued by the makers to the purchasers of the lantern, and the greatest care in dealing with the gases is requisite to prevent accidents, which may be easily caused by ignorance or carelessness, but which may by caution be as easily avoided. No one, however, should attempt to use the lime-light without having a practical lesson in the manipulation of the lantern. No accidents are at all likely to happen when oil is used, provided the oil is of good quality—the best paraffin or petroleum; the cheaper kinds which have a low flashing point should be avoided as dangerous. But care must be taken or the best results will not be obtained, smoke, scattering smuts all over the room and an unpleasant smell, are disagreeable accompaniments often met with when oil lanterns are used.

(*To be continued.*)

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Editorial Table.

METOL DEVELOPER.—Messrs. Schwarz & Co. recommend the following new formulæ in connection with Dr. Andresen's Metol for which they are agents:—Dissolve in 8 ozs. water Dr. Andresen's Metol, 10 grains; then add Carbonate of Potash, 60 grains; Sulphate of Soda, 30 grains; Bromide of Potassium, 2 grains. For Over Exposure add a few drops of a 10 per. cent. Solution of Acetic Acid; for Under Exposure add a few drops of a 10 per cent. Solution of Carbonate of Potash.

BROMIDE PAPER DEVELOPER. — The following new formulæ is advocated for Bromide Paper by Messrs. Fuerst Bros., the agents for Metol-Hauff:—For Bromide Paper the normal Metol-Developer requires much less exposure than Ferrous Oxalate. The best plan is to use the Metol-Potash-Carbonate-Developer in concentrated form. The developer should be kept up to strength and exposure made to suit that strength, so as to obtain results which cannot be distinguished from results by Ferrous Oxalate. A little Bromide Solution (1 : 10) say ½ grain to 1 grain per oz. of developer should be used which allows more latitude of exposure than Ferrous Oxide; if these instructions be carried out, the best tones will be obtained. If the developer as a whole is much diluted or if the alkali is much reduced in proportion, or if too much Bromide be added, the tones will be more grey and less black than is usually desired. When soft greyish prints are required, as for aftertoning or intensification, the plan is to dilute the developer.

Notes and Queries.

W. J. McCullock (Queensland).—The parcel containing the goods was sent early last month. We hope the contents will arrive safely.

W. E. Woodbury.—Congratulations.

J. Green, Wilkinson & Co., Nevar, Heward, Budd, Jackson, and others.—We cannot insert any further letters *re* invention of dissolving views unless they are strictly to the point.

J.W.S. writes: "(1) Would it be feasible to make a square gas bag with a wooden top and bottom, thus dispensing with pressure boards? (2) What kind of wood is the best? (3) What must the wood be coated with inside? (4) What size for 10 ft. capacity? (5) What material for sides, and how much, and how fastened? (6) Price of materials, and if procurable at ordinary india-rubber dealers. (7) Would this style be as convenient and durable as the wedge-shaped bag? (8) How can the cloth be fastened to the wood? (9) What kind of tap, and where to fix it?" *Answer.*—(1) This style was tried commercially, but given up about 1865. The bag alluded to had rubber-cloth sides and bottom, and a wooden top, at the corners of which were large screweyes. The stand was a wooden base, with four iron uprights, on which the screweyes travelled, thus serving as a guide. (2) Any hard or close grained wood. (3) Shellac vanish will answer. (4) 2 ft. by 2 ft. by 2½ ft. might do. (5) Stout rubber-cloth of the size stated in No. 4 answer, fastened with rubber cement. (6) We do not know cost, but quality influences it considerably; at most rubber dealers. (7) No, the wedge-shaped bag will be found preferable. (8) Cement, nails, and a strip of wood. (9) Any metal tap on the board at top.

Dealer writes: "I have the picture of a piece of apparatus, but I have, unfortunately, lost the wooden block upon which it was cut. Is there any way of making another without being at the expense of having another engraved?" *Reply.*—You can have the picture photographed on zinc and then etched, and as many electros cast from this as you desire.

W. Barbour.—The noise you mention may occur from a variety of causes, but as you say that the jet has hitherto been quiet, you might clean it out carefully, and see if that will remedy it.

Ed. Westcott.—Of course, you can get an image with the lens you describe, but for lantern purposes it is not much use, as it is of such small diameter.

"Stink."—We note what you say about the oil refusing to burn without giving off an unpleasant smell. Read the first portion of Mr. Harrison's article on page 112 of this issue.

Ajax.—Mr. W. C. Hughes makes a skeleton triple lantern.

Triple.—See our issue for February, 1893, for particulars *re* management.

W. Thorne.—(1) You must look to the objective, as it is this that determines the nature of the definition of the projected picture. (2) A lens of short focus should have the back combination of large diameter, otherwise much of the light will be lost.

J. R. N.—The articles on Enlarging, by Mr. A. R. Dresser, appeared in our issues of Nov. and Dec., 1890, and Jan., Feb., March and April, 1891.

F. J. Balson.—The book is not yet published.